

XVIII. *On Insects injurious to the Cotton Plant.* By W. W. SAUNDERS, Esq., F.L.S.

[Read February 3rd, 1851.]

HAVING had my attention recently called to the insects injurious to the Cotton plant, I have been seeking for information on this subject from various sources, where I expected to have found the object of my inquiries fully answered. It is with surprise, however, that I discover that the insects in question have been but very little studied, and have scarcely excited the attention of those interested in the growth of cotton; although it is evident, from the accounts published of the ravages of these insects, that at times the amount of loss to the planter must have been very great. No careful description, nor well directed observations, seem to have been made by our Transatlantic brethren on the various insects which we read of under the names of Chenille, Cotton Bug, Cutworm, &c., &c., insects well known to the planters, as their worst enemies, and concerning them the particulars I have to offer are of a very unsatisfactory kind, wanting entirely in that exact information so necessary to the entomological inquirer, and which, if fully developed, might lead to some satisfactory method of diminishing, if not preventing, the injuries so much complained of. A short account of these insects, extracted from Porter's *Tropical Agriculturist*, and the *History of the Cotton Manufacture*, by Dr. Ure, is all that I can discover of any value on the subject, and the extracts hereafter made will show that the information afforded is of a very scanty and unsatisfactory nature. Pursuing the subject further, I find a brief notice and description of a moth injurious to the cotton plant in Abbot and Smith's *Insects of Georgia*, which may be one of those alluded to by Mr. Porter or Dr. Ure; but I have no means of proving their identity. There is also in the *Transactions of the Entomological Society*, vol. iii., a notice of a small moth, very injurious to the cotton plant, at Broach, in the East Indies, which I brought to the notice of this Society, and called *Depressaria Gossypiella*. The published information on insects injurious to the cotton plant, appears to terminate here, as far as I can ascertain; and it is my intention, after laying a short account of the insects alluded to before this Society, to proceed to the description of some others, about which I have more positive information, trusting that the whole may be

of some use as a first step towards a history of the insects injurious to the cotton plant; and *may* bring this important subject to the notice of Entomologists, especially of those who have opportunities of witnessing the ravages committed by these insects, and induce them to record their observations, with a view of furnishing information for a more complete illustration of the subject hereafter.

The CHENILLE, of Guiana and Bahamas.—Mr. Porter mentions this caterpillar as follows:—"Another very serious peril to which the plant is liable results from the ravages of an insect called the cotton caterpillar, but more generally known upon cotton plantations as the Chenille. This destroyer is generally about an inch or an inch and a half in length; its back and sides are glossy black; a single line of white runs down the whole length of the back, at its middle, and double white lines are seen at each side of the single line, and running parallel to it. The belly is of a whitish yellow colour, and is covered with a soft downy hair intermixed with bristles, which are short and black. These insects have a most rapacious appetite; they sometimes appear singly, or in small companies, but at other times are in such swarms that whole fields of cotton plants, which gave no sign of their presence on the previous evening, are seen in the morning completely devoured, so that not a leaf, a flower, a pod, or a green sprout remains. A very singular effect accompanies the ravages of this little enemy. Although the insect itself gives out no smell, and the plants are equally inodorous, yet while the Chenille is feeding on its leaves, a strong and uncommonly fragrant smell is perceptible at more than one hundred yards distance. This army of caterpillars moves off to another field as soon as one is destroyed; and it appears that they exhibit great capriciousness in the choice of their feeding grounds, and are often found commencing their attacks in the centre of a field instead of at the circumference, as might have been expected."—*Tropical Agriculturist*, pp. 24 and 25.

Dr. Ure says, "the cotton plant of Guiana is particularly subject to the attacks of the Chenille."—*Ure's Cotton*, p. 130.

"The Army Worm of the United States is probably identical with the Chenille, or is a caterpillar very similar to it in its mode of carrying on its ravages. The visits of the Chenille seldom recur more frequently than once in three years; its whole existence is limited to twenty-seven days, nine of which it passes in the form of a moth."—*Trop. Agric.* p. 26.

The COTTON MOTH of Georgia and South Carolina.—Dr. Ure gives the following account of this moth:—"The August full moon is likewise the time when the caterpillar makes its appearance. It is the offspring of a small brown moth, resembling the candle moth, which deposits its eggs upon the leaves of the *Gossypium*, always a night or two before the full or new moon; they hatch a few hours after they are deposited, and are so small at first as to be hardly discernible to the naked eye; they do little or no damage during the first nine or ten days of their life, like the silkworm eating little in their infancy, but a few days before they complete their growth they become so excessively voracious as to destroy an entire plantation in a few hours. Mr. Spalding has seen 400 acres of cotton of a promising aspect, which four days thereafter did not possess a green leaf, or scarcely a solitary pod upon a plant."—*Ure's Cotton*, p. 106.

CUTWORM or GRUB, of Georgia and Guiana, is thus mentioned.—"When both these sources of danger (frost and north-east wind) are past, there is another enemy, equally destructive, the cockchafer or cutworm, which prevails in the month of April. As the cotton comes through the ground and remains several days, like the pea or other pulse, with only two radical leaves, every one of the plants cut above or below the ground is destroyed, in consequence of which whole fields have not unfrequently to be replanted in the month of May."—*Ure, loc. cit.* p. 105.

"Another description of caterpillar, hurtful to the cotton plant, is one which continues either buried in, or crawling on the surface of the ground, it being incapable of climbing. The ravages of this insect are consequently at an end, after the first week following the appearance of the plant above the ground. The ravages of these insects are said by Mr. Edwards to be so great, that it is necessary every third or fourth year to resort to fresh land in order to avoid them."—*Tropical Agriculturist*, p. 26.

The COTTON BUG, of Guiana.—This insect is alluded to by Mr. Porter, as follows:—"It is a concomitant of this disease (the blast), that the plant is attacked by a peculiar kind of insect called the cotton bug, which infests the pods by swarms, and contributes greatly to the destruction of the crop; this, which is one of the effects, has sometimes been mistakenly considered as a cause of the blast. The insect, which is a species of *Cimex*, is of a scarlet colour when young. If crushed when full grown,

a powerful and offensive smell will be perceived, very similar to that given out under similar circumstances by its European and more domestic namesake.”—*Tropical Agriculturist*, p. 24.

“There are, moreover, red and black bugs, which sometimes suck the seeds of the cotton plant at the period when the capsules open. When seeds so gnawed get accidentally between the rollers of the gin, they are crushed flat, and cause the wool to be soiled with the animal impurities of the bug.”—*Ure, loc. cit.* p. 131.

Apate monachus, of Guiana.—Dr. Ure observes, “this species of *Scarabé*, the *Apate monachus*, is a third enemy of the cotton plant. The larva of this insect begins its attack by boring a hole in the green bark of the cotton tree; it penetrates into the albamum, eats it with a revolving motion under the bark, and proceeds then to the wood and pith; the branches thus attacked dry up and perish.”—*Ure, loc. cit.* p. 130.

This insect may be identical with the boll or bore worm of the planters, which Mr. Turner, in a communication to Dr. Royle, supposes to be the larva of a Coleopterous insect, probably a *Curculio*.

Referring now to the species, of which there is more positive information to be obtained, I will place them in two divisions; the first containing those which have already been described, and the second such only as are for the first time brought forward as injurious to the cotton plant. In the first division may be mentioned the smeared or cotton moth, *Phalæna oblongata* of Abbot and Smith’s insects of Georgia, figured on plate 94 of that work, and shortly described at page 187, *loc. cit.* in the following terms, “*Ph. noctua*, spirilinqvis cristata, alis lanceolatis, cœnis punctis nigris marginem versus effluentibus.” This, more fully described from the figure, has the fore wings above pale blueish ash grey, covered with indistinct irregularly shaped darkish spot-like markings on the disk, and a row of more distinct round spots of the same colour parallel to the exterior margin; the hind wings white, with the nervures yellowish, and with a row of black marginal spots. The head and thorax are of the same ash grey as the fore wings, and the abdomen is yellowish white, with the last four or five apical joints tinged with ash grey. The caterpillar is black, with a broad irregular lateral yellow band on each side, and the joints of the body transversely margined with the same colour; the joints are marked above with red spots and

bunches of reddish brown hairs. The caterpillar feeds on the cotton and other plants, and the moth appears in April. Found in Virginia and Georgia. Pl. XII., figs. 3 and 4.

Next I may mention a small moth which I described in the Transactions of the Entomological Society, vol. iii. p. 284, under the name of *Depressaria Gossypiella*. This little moth belongs to the large family of minute moths, the *Tineidæ*, and I am under obligation to my friend Dr. Royle, who takes such a lively interest in all that concerns the commerce and agriculture of the East Indies, for bringing its habits and economy to my notice. Dr. Royle obtained his information from Dr. Barn, superintendent of the government cotton plantations at Broach, who describes the larva as very destructive to the American cotton grown at Broach, but seldom affecting the native cotton. The larva feeds upon the cotton seed until the pod is about to burst. The moth is $\frac{4}{10}$ of an inch in the expansion of the wings, and is of a dark fuscous brown colour, the anterior wings having a round blackish spot on the disk, and a band of the same colour crossing the wings a little above the apex, which itself is black.

Under the second head of species, now for the first time brought forward, as injurious to the cotton plant, in the first place I will describe two, for the knowledge of which I am indebted to Dr. Horsfield, the talented Entomologist who has charge of the Entomological collection of the Honourable East India Company, and whose researches in Java will ever render his name memorable among Entomologists.

Arctia Horsfieldii. ♂.

Antennæ blade greyish white, pectinæ reddish brown. Thorax rounded above, purplish ashy grey. Abdomen brownish orange. Anterior wings, *above*, purplish ashy grey, crossed with several abbreviated, obsolete, wavy, dark ashy grey lines, running parallel with the outer margin, and a more defined zigzag line of the same colour near the base; and with an elongate, reniform, eye-like, dark grey spot on the disk, a little behind the anterior margin, and near the centre of the same; *below*, yellowish grey, with a dark grey spot corresponding with the reniform mark on the upper surface. Posterior wings brownish orange, gradually changing to purplish ash grey on the outer margin, marked on the disk with a dark grey spot, and with radiating lines of the same colour running through the purplish grey of the outer margin, fore legs ashy grey, middle and hinder legs cream-coloured. Caterpillar yellowish white, covered with long lemon-coloured hairs. The joints of the body each crossed above with an ash grey lunulate

spot, and a round, rather large, black spot on the upper side of the third joint. Chrysalis bright shining chesnut brown, enclosed in a case of loose, thin, fragile, yellowish brown, silky fibres. Feeds on the *Gossypium herbaceum*, Lin. (Kapas, Java). A native of Java, appears in the month of August. Dr. Horsfield.

Length of body, 9 lines.

Expansion of wings, 1 inch, 10 lines.

Perfect insect, Pl. XII., fig. 2.

Caterpillar, Pl. XII., fig. 1.

Fam. PYRALIDÆ.

EUDIOPTES, Hübner.

PHAKELLURA, Land. Guelding (MSS. ? according to Poey.)

Head small, not so broad as the thorax, with the eyes round and prominent. Palpi short, but little apparent. Tongue long, spirally twisted when drawn in. Antennæ three-fourths the length of the body, setaceous, cylindrical, consisting of a great number of joints. Thorax rounded, even above. Wings with the disk covered with hyaline scales, and margined anteriorly and laterally with a broad band of dark scales. The fore wings elongate, pointed, about the length of the abdomen. Abdomen cylindrical, the terminal joint furnished with a dense radiating tuft of hair-like scales. Legs long, slender, the hinder tibiæ with one strong spur at the apex, and a pair set close together about midway between the apex and the femur.

E. Indica.

Head and thorax dark silky, sepia brown; antennæ nearly as long as the wings, greyish brown, getting darker at the base. Tongue half the length of the body. Abdomen white, with a dark sepia brown fascia across the apical joint, which is furnished at the apex with a radiating tuft of dark sepia brown closely set hairs. Legs long, creamy white, with the apices of the tibiæ strongly spurred. Anterior wings hyaline, reflecting an azure tint, with a broad dark sepia brown even band along the anterior and exterior margins, the band rather widening as it approaches the posterior angle, and showing a slight curvature on the hyaline disk. Posterior wings hyaline, with a band of the same width and colour as the anterior around its exterior margin, gradually drawing to a point as it nears the anal angle.

Expansion of wings 10 to 12 lines.

Length of body 6 to 7 lines.

Caterpillar.—Mouth pale grass green, with the head yellowish.

Pupa dull chesnut, enclosed in a case of portion of a leaf drawn together with silken threads.

Feeds on the *Gossypium herbaceum* (Kapas, Java), and on the *Erythrina corollodendron* (Dadap Srep, Java). Is common in Java from January to April.—Dr. Horsfield.

Perfect insect, fig. 7.

Caterpillar, fig. 5.

Chrysalis in case, laid open, fig. 6.

This species is a very near ally to the *Pyralis hyalinata*, Lin. Poey, Cen. Lep. Cuba, pl. 19 (which belongs to the genus *Eudiptes*, Hüb.), but it differs from it in the somewhat smaller size, broader band round the wings, in the nature of the chrysalis case, and being found only in the East Indies, while the species described by Poey seems to be as exclusively limited to the new world, and is found in Cuba, Jamaica, Brazil and Honduras. A third closely allied but distinct species is found on the west coast of Africa.

For the information concerning the three following insects I am indebted again to Dr. Royle, who handed me a communication, accompanied by a drawing, he had received from Sam. Simpson, Esq., government cotton planter in the East Indies; and although the communication is short, it is very interesting, and tells well for the observing qualities of that gentleman, and shows how capable he is of working out the subject of the cotton insects of India to a very satisfactory termination.

Mr. Simpson states, that the effect of the attack of these insects is to cause dark greenish blotches on the leaves, as shown in figures 8, 9 and 10, Pl. XII. These blotches are occasioned by the insects having recently fed there; and the result is, that the leaves bleed from the injured parts, and, from the heat of the sun, they eventually curl up, as shown at fig. 10, assuming the appearance of leaves touched by the frost, or scorched by fire. This curling of the leaves much injures the growth of the cotton plants, and considerably influences the crop.

The first insect mentioned by Mr. Simpson is the larva of some beetle, probably of the family *Chrysomelidæ*. The appearance of the eggs of the insect, which are white, oval, and closely laid together, as observed by this gentleman at 8 A.M., is shown at *a*, fig. 8. The same eggs, just hatching, were observed at noon, and are shown somewhat magnified at *b*, fig. 9. Three hours afterwards the young larvæ were seen feeding, and are shown at *c*, fig. 9, also magnified. These larvæ are elongate, ovate, dirty green, with a red head; they have six feet, and the whole surface

of the body appears to be covered with short spine-like processes or tubercules.

The second insect mentioned by Mr. Simpson is evidently an *Aphis* of a green colour, and about one-eighth of an inch in length. The drawing is not sufficiently accurate to form any idea of the species, and I shall therefore give it the pro tem. name of *Aphis Gossypii*. This species is shown magnified, and real size? at *ee*, fig. 8; and has an ovate abdomen, furnished at the apex with two shortish setæ, and the head furnished with antennæ about two-thirds the length of the body.

The third insect is shown magnified at *d*, fig. 8 and 9, and does not exceed one-eighth of an inch in length. It has six legs, and an incurved ructorial apparatus, with a pointed abdomen, considerably projecting beyond the immature wing cases. The general colour is pale grass-green, with the wing cases of the same colour, but much darker.

Mr. Simpson has figured one specimen, *d*, fig. 8, with setaceous antennæ about half the length of the body, while there is no appearance of these organs on the other specimen, *d*, fig. 9; but they are so evidently the same insect, that there being no antennæ in the latter case is clearly an error in the drawing. This is an immature state of some member of the large order *Homoptera*, and probably will be found related to the *Cercopidæ*, and not far removed from the genus *Typhlocyba* of Germar.

As the foregoing notices are strung together without any attempt to classify the insects, it will be as well, in conclusion, shortly to recapitulate what has been said; and it results that there is evidence of twelve insects having been found injurious to the cotton plant, viz.—

- 6 caterpillars of moths,
- 3 larvæ of beetles,
- 1 immature state of an Homopterous insect,
- 1 *Cimex*,
- 1 *Aphis*,
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- 12
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which have been treated on in the following order:—

1. The caterpillar of a moth, known by the name of Chenille in Guiana, and Army Worm in the United States.
2. The caterpillar of a moth, known as the Cotton Moth of Guiana.

3. The Cut Worm or Grub of Georgia and Guiana, which is the larva of a beetle.
 4. The Cotton Bug, an insect belonging to the family *Cimicidæ*.
 5. The insect called *Apate Monachus*, of Guiana, probably identical with the Bore Worm or Boll Worm of the United States, and supposed to be the larva of a *Curculio*.
 6. The caterpillar of *Phalæna oblinata* of Abbot and Smith.
 7. The caterpillar of *Depressaria Gossypiella* of W. W. Saunders, Ent. Trans.
 8. The caterpillar of *Arctia Horsfieldii*, now described.
 9. The caterpillar of *Eudiptes Indica*, now first described.
 10. The larva of a beetle supposed to belong to the family *Chrysomelidæ*.
 11. An *Aphis*, or plant louse.
 12. The immature state of an Homopterous insect allied to *Typhlocyba*.
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